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ABSTRACT

The Tennessee Technological University's Program of Special Education sponsors a "Super Saturday" of enrichment activities for gifted and talented students as well as students with learning disabilities. A session on horticulture was planned and arranged by students in a class on horticultural therapy who designed learning activities of two types: general exploratory activities (Type I) and hands-on group activities for development of skill and practical knowledge (Type II). Type I activities, conducted during a two-hour morning session, included a hay ride tour of the farm, introduction to plant anatomy using a rubber tree, introduction to the water cycle, a slide show on transplanting and special plant structures, and a demonstration of the making of an air layer on a rubber tree. Type II activities, conducted during a two-hour afternoon session, included making a terrarium to demonstrate the water cycle, propagating new spider plants, transplanting greenhouse and nursery plants, and plant identification. Positive results included exposure of the special education students to horticulture, interaction among the two groups of students, and an opportunity for the horticultural therapy students to practice their training. Contains 17 references. (BRM)

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Horticulture Therapy Activities for Exceptional Students

Douglas L. Airhart, Kathleen M. Doutt, and Thomas W. Willis

Abstract

The purpose of this article is to discuss the application of horticultural topics and activities to the education and training of exceptional elementary students. The activities were coordinated through an existing program in the Special Education Program. Students in the Horticultural Therapy class in the School of Agriculture were required to develop two types of Special Education training procedures using horticulture subjects. The interaction of Horticultural Therapy and Special Education students sparked enthusiasm for training and learning.

Introduction

"Super Saturday" is an educational event sponsored by the Program of Special Education at Tennessee Technological University for gifted and talented as well as learning disabled children. The goals of the "Super Saturday" program are to broaden the children's concepts of what can be learned in school; to offer enrichment activities which should interest them; and to allow these two groups of children to be integrated into enrichment activities (3). The "Super Saturday" events offered instruction in photography, ceramics, general drawing, Upper Cumberland studies, creative writing, physical development, and horticulture. The purpose of the horticulture session was to introduce the value of plants to our lives (16), and especially to the lives of children (17). The horticultural activities were sponsored by the School of Agriculture and were planned and arranged through the Horticultural Therapy Class.

Horticulture Therapy (2,10) is the science and practice of using plants and plant related activities in a treatment setting (8). It is especially useful as a therapeutic tool for the emotionally ill (5). Horticultural Therapy has also been shown to provide benefits to special education students (1), to vocational rehabilitation of handicapped individuals (11), in substance abuse treatment (4) and in geriatrics facilities (9,15). A recent erport (6) has shown that human stress indicators can be reduced through horticultural vocational training.

Students in the Horticultural Therapy class were assigned the task of designing Type I and Type II learning activities (12) for learning disabled and for gifted and talented children. Type I and Type II activities are primarily designed as general exploratory activities and group training activities, respectively. According to the "Enrichment Triad Model" developed by Dr. Joseph Renzulli (13):

> "Type I and Type II activities are considered to be appropriate for all learners; however, they are also important in the overall enrichment for gifted and talented students for two reasons. First, they deal with strategies for expanding students' interests and developing the thinking and feeling processes and for this reason they are viewed as necessary ingredients in any enrichment program. Second, and perhaps more importantly, these two types of enrichment represent logical input and support systems for Type III Enrichment which is considered to be the only type that is appropriate mainly for gifted students." (page 13)

In accordance with program philosophy, Type I activities were designed as general exposure to the field of horticulture and Type II activities were designed to teach needed skills to the participants so that they could successfully meet the goals established for the session. The morning and afternoon sessions were two hours each; the morning session was devoted to Type I activities and the afternoon session was devoted to the Type II activities.

Type I: General Exposure Topics

Farm Tour. The group was introduced to agriculture with a hay-ride tour of all of the farm activities, including: field grown nursery crops, piglets being reared to weaning size, swine production facilities, dairy and production areas, the milk production area, and the calving barn, where they inspected a newborn Jersey calf. The group then returned to the headhouse classroom to begin other activities.

Plant Anatomy. A large rubber tree (**Ficus elastica** 'Decora') was used to show major parts of a plant, e.g. the roots, the stem, the leaves, and the axillary buds (7). A description was given explaining how the axillary buds remained dormant until the terminal was removed, after which they grew to form new branches. Distinctive characteristics were given of the epidermis, the phloem, the cambium and the xylem tissues that could be seen in cross section of the stem. A monocot plant with strap-like leaves was included to show that not all plants had the same types of nodes and internodes.

Water cycle. A transparency of the general water cycle was projected which described precipitation, interception by trees, surface runoff and the accumulation of water bodies, infiltration, percolation, leaching of nutrients, and ground-water flow (14). The discussion included an explanation of how plants

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absorb water through their roots, and then transpire water into the air, and how surface evaporation condenses into clouds which could precipitate and complete the cycle. The lecture on the water cycle was prepared to expose the children to the possibility of creating their own cyclic environment using a terrarium, which was to be a Type II activity in the afternoon.

Transplanting. A slide set on transplanting nursery field stock was used to describe containerized plants, bare-root plants, and balled and burlapped plants. It described general root structure plus stem structure. The main purpose was to introduce proper care in handling other plant materials which might be found when they went with their parents to the garden center to buy landscape materials. This activity was designed to prepare the students for transplanting Type II activity that afternoon.

Special plant structures. (7) This session was begun with the **tunicate bulbs** of daffodil (**Narcissus**), hyacinth (**Hyacinthus**), and onion (Allium) and **scaly bulb** of lily (**Lilium longiflorum**). Explanations were given that the bulbs had been "forced" into flower by special treatment to produce plants in bud and flower, which were used to stimulate interest. The hyacinths were used to demonstrate the early "tight" buds and to introduce the colorful and fragrant flower they would see in their yard later on in the month. Samples of **tuberous roots** from the dahlia plant (**Dahlia hybrida**) were shown as well as **swollen roots** from a spider plant (**Chlorophytum comosum**). Descriptions were given about different characteristics of food and water storage. Explanations were given on how the **runners** of the spider plant formed new plantlets on the ends and caused the plant to look very much like a spider. A snake plant (**Sansevieria trifasciata**) was included to demonstrate the thick fleshy stem tissue of a **rhizome.** The final specialized structure was a **foliar embryo,** using kalanchoe (**K. diagremontiana**) with embryos on the margins, and a piggy-back plant (**Tolmiea menziesii**) with embryos at the petiole/blade junction.

Fruits. One horticultural therapy student arranged a table full of different types of fruits from the grocery store in order to expose the children to the fact that horticulture is not limited to foliage plants, but also includes production of fruits and vegetables. The children recognized bananas, grapes, oranges, avocados, and apples. In addition, figs, dates, raisins, currants, nectarines, enoki mushrooms, regular mushrooms, plantains, water chestnuts, and an unusual fruit called a Mexican potato which was crunchy and tasty were present.

Propagation. The final Type I activity was a demonstration of how to make an air layer (7) on a rubber tree (**Ficus elastica**). Demonstrations were given to show how to use a knife to make a ring girdle, cutting through the epidermis and phloem tissues to the cambium and removing a band of tissue to expose the xylem. Descriptions were given on water movement in the xylem tissue and how the phloem tissue transported the photosynthates from the leaves to other parts of the plant. Explanations were given on how the ring girdle interrupted normal flow patterns, which in turn would cause the accumulation of chemicals to induce roots to form. The air layer was completed with moist sphagnum moss wrapped in plastic film, surrounded with a layer of tin foil to block out light. A stem that had been previously air layered was used to demonstrate how the roots would form. Shears were used to sever the example air layer and the students were instructed how to treat the new plant after removal from the mother plant.

Prior to the lunch break, the children were allowed to meander into the greenhouse until transportation arrived. Miscellaneous fruit was carried back and used to teach some of the parents and adult assistants about different types of fruits during the lunch time.

Type II: Active Practice Topics

Water Cycle. The first hands-on activity available consisted of making a terrarium. Large, clear, frozen yogurt containers with clear snap-on tops were purchased and were large enough to hold three or four new plants. The terraria were first lined with stone for drainage and then filled with a moistened peat mix. The children were shown how to dig holes with their fingers and to select from two to four plants of their choice, putting the biggest in the middle and the smaller ones around the outside, and tamping them in. A fine mist was applied to put some moisture on them before covering. Condensation on the container walls was an indication of the water cycle, which proved to be quite successful. The children seemed to find this very exciting and to learn a great deal about the water cycle and how plants survive and use water.

Propagation. This activity was simply called "making new plants," and consisted of using a spider plant with lots of runners and a large purple wandering jew (**Zebrina pendula**). A unique feature was the use of an egg carton as a container. The instructions were to: (a) punch holes in the bottom of the egg slots; (b) separate the bottom from the top and use the carton tops as a tray for the bottom; (c) fill the sections with perlite until the whole tray is level; (d) use a pencil or finger to drill a little hole and insert the cutting; and (e) firm the perlite and make a plant label with each name on it. Proper rooting conditions were supplied by putting the egg carton and all the cuttings very conveniently into a bread bag. The bread bag maintained a high humidity to protect the plants and allow time for rooting. Everyone seemed to enjoy the idea that they were making plants.

Transplanting. The third activity was stepping-up large, established greenhouse plants and nursery plants. The children were given 4 to 6 inch potted plants and shown how to remove the pot and to scruff up the roots on the bottom so they would not continue to grow around in a circle. Potting mix was placed on the bottom of the new

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6 to 8 inch pot to make a little cone which would encourage the old roots to grow outward and downward rather than around in a mass. Mix was added around the sides and tamped in with fingers and thumbs to firmly place the soil in the new pot. Young bare-rooted cuttings were also available for transplanting into 4 inch containers.

Plant Identification. Upon completion of the tasks, children were given descriptive tours of the various stock plants and potted crops grown in the greenhouses. The hardiest interior plantscaping species were emphasized.

General Considerations

The main objective of the Horticultural Therapy activities on "Super Saturday" was to provide exposure to horticulture and plant science. The children were to be introduced to the vital role plants play in our lives as humans (17). The second objective was to make sure everybody had plants to take home with them.

No effort was made to segregate the two groups of children during the activities; their interaction is part of the "Super Saturday" programming concept. The hay ride field trip provided a good introduction and was particularly successful because it had everyone excited. It worked quite well to separate the morning session into Type I exposures, which prepared them for the related Type II tasks which were completed in the afternoon. Original plans to break into individual groups that afternoon proved to be unsatisfactory. Every task was performed separately as one group, taking about 30-45 minutes for each activity. The terraria, the plant propagation, and the transplanting activities provided successful Type II learning, and everybody was excited because they got to take plants home.

Summary

Horticultural Therapy activities were very successful with special education children, and provided good experimental training for the Horticultural Therapy students. The broad range of activities captured the attention of everyone, including the supervising aides. Children were able to interact among themselves and our students, and questions were asked during each activity. Hands-on activities allowed our Horticulture Therapy students to practice their training by teaching others and also kept the children motivated to complete their tasks. Horticulture is continuing to be offered to the Special Education program.

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